

MEAP

Michigan Educational Assessment Program

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Science



5th Grade

Released: Summer 2001

**MICHIGAN STATE BOARD OF EDUCATION
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The Model MEAP Science Tests

Test Items

MEAP has provided models of the new science test for the 5th, 8th, and 11th grade. These models present examples of the new science test items. By new, all science test items administered after January 1, 2002 will be aligned to the benchmarks within the Michigan Science Curriculum Framework (MSCF, Summer, 2000). The MSCF is available for you to download from this website: cdp.mde.state.mi.us/Science.

The MEAP science test will be composed of (a) independent multiple-choice items, and (b) clusters of 3 multiple-choice items and 1 constructed-response item. All multiple-choice items are worth 1 point, a constructed-response item (i.e. a short written answer) is worth either 3 or 4 points. The 4-point constructed-response items apply to the text-criticism and investigation clusters.

An answer key follows the test items in the model tests. The answer key provides the answers for the multiple-choice items and the point-scoring guide for the constructed-response items. Also listed for each item is its corresponding MSCF benchmark.

The New MEAP Science Test Format

The new 5th-grade science test will have 46 items for 60 points. Included among the items are 6 clusters, 1 each for earth, life, and physical science, along with an integrated cluster (i.e. 2 science subjects covered in a single cluster), a text-criticism cluster, and an investigation cluster. The test also has 22 independent multiple-choice items.

Also note, the arrangement of items in the model tests do **not** necessarily replicate the final printed format of an actual MEAP Science test in regard to item, cluster, or subject sequence. The test format plans are still in progress.

PART 1

DIRECTIONS

In this test you will demonstrate your understanding of science.

You will have at least 50 minutes to complete this part of the test.

This test includes both multiple-choice and written-response questions. For the multiple-choice questions, use only a **No. 2 pencil** to mark your answers. Make a dark mark that completely fills the corresponding oval **in your ANSWER BOOKLET**. If you are not sure of the answer to a multiple-choice question, mark your **BEST** choice and go on to the next question. If you change an answer, be sure to erase the first mark completely. Remember, mark only **one** answer for each question.

Following a series of multiple-choice items are constructed-response questions that require a written response. These questions require you to write sentences or paragraphs **in your ANSWER BOOKLET**. Try to show all that you know about the topics by writing as much as you can in response to the questions you are asked. Make sure you at least attempt to answer each question. Record your written responses **in the ANSWER BOOKLET** on the lines or spaces provided. **Make sure the number of the question corresponds to the number in the ANSWER BOOKLET.**

If you do not understand any of these directions, please raise your hand.

Note: You may use your Reducing Friction Investigation Student Journal to answer questions 22 through 25.

1. The following chart shows the amount of rainfall in Detroit for one week.

Rainfall in Centimeters	
Day	Rain
Sunday	1 cm
Monday	3 cm
Tuesday	2 cm
Wednesday	0 cm
Thursday	4 cm
Friday	1 cm
Saturday	0 cm

What was the total amount of rainfall for that week?

- A 2 cm
- B 5 cm
- C 9 cm
- D 11 cm

2. The planets in our solar system are often referred to as satellites of the sun because they move around it. Which of the following is a satellite of Earth?
- A Mars
 - B the moon
 - C Halley's comet
 - D the Milky Way
3. Leonard is learning about what happens as the seasons change. What is a visible sign that summer is changing to fall?
- A The days get longer.
 - B The days get warmer.
 - C Leaves begin to change color.
 - D An eclipse of the sun happens.

4. Katie went to visit her grandmother who lives in Flint. It was raining on the day that she arrived. She turned on the news to see if the weather would improve. The weather reporter said there was a tornado warning in her area. Which of the following is a condition that Katie should expect during a tornado?
- A clearing skies and sunshine
 - B an increase in the air temperature
 - C formation of a funnel-shaped cloud
 - D a decrease in the speed of the wind
5. Which of the following is a form of water in its solid state?
- A fog
 - B rain
 - C hail
 - D clouds

6. Teresa's art class uses a lot of paper when doing projects. Her teacher is always careful to collect all of the paper scraps. What is a good thing that the teacher can do with the scrap paper she collects?
- A Bury it in the ground.
 - B Put it in the burn pile.
 - C Take it out to the dumpster.
 - D Put it in the scrap box to reuse.
7. Carlos visits his grandmother's farm every summer. He likes to go down to the river and fish. Carlos has noticed a change in the river over the past few years. It seems to have gotten wider. What could have caused this river to become wider?
- A earthquakes
 - B water pollution
 - C volcanic activity
 - D erosion

Mr. Romano, a teacher, organized a recycling program among students and staff



at school. He used the program to teach the benefit of recycling.

Refer to the text and picture above to answer questions 8 through 11.

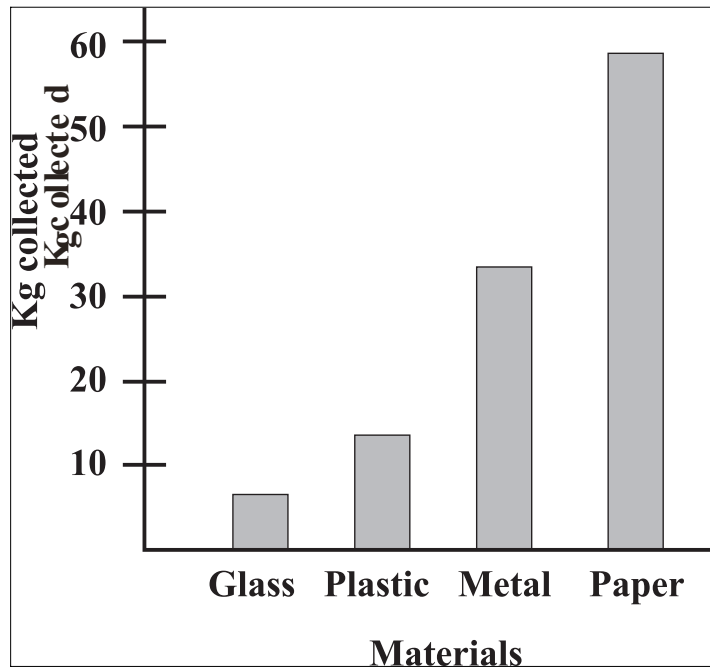
8. The school cafeteria has begun a recycling program. Which of the following should be reused rather than recycled?
- A food
 - B paper plates
 - C plastic trays
 - D milk cartons

Kilograms of Newspaper Collected

	Oct.	Nov.	Dec.	Jan.	Feb.
Second Grade	42	53	42	56	53
Third Grade	27	35	37	42	50
Fourth Grade	31	40	39	50	52
Fifth Grade	35	43	40	53	52

9. Which grade shows an increase each month in the number of kilograms collected over the five-month period?
- A Second Grade
 - B Third Grade
 - C Fourth Grade
 - D Fifth Grade

10. The bar graph below describes one week's results of recycling by the school. Use the graph to answer the question that follows.



Which category has the **MOST** kilograms of recyclable material?

- A glass
- B metal
- C paper
- D plastic

**ANSWER THE FOLLOWING CONSTRUCTED-RESPONSE ITEM IN
YOUR ANSWER BOOKLET**

NOTHING WRITTEN IN THE SPACE BELOW WILL BE SCORED.

(3 points)

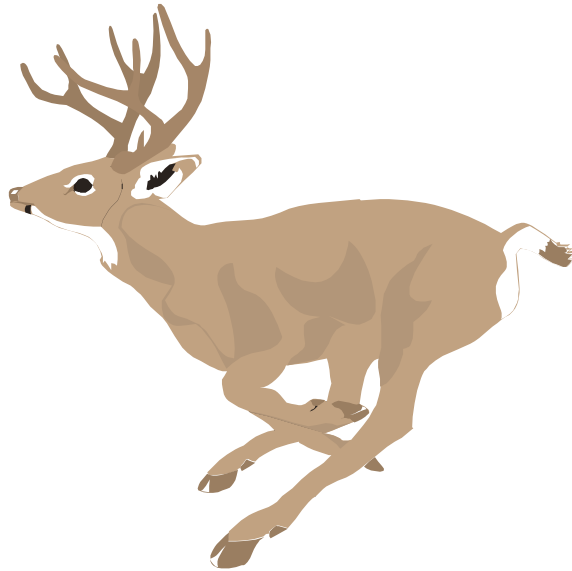
11. Mr. Romano has put up recycling bins for paper, cans, and bottles.

- What are three possible benefits of Mr. Romano's recycling efforts?

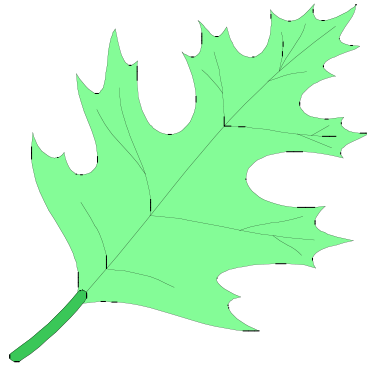
Nina's family lives on a farm in north-central Michigan. The fields of the farm are next to a large state forest.



Refer to the text and picture above to answer questions 12 through 15.



12. Nina often sees white-tailed deer in the fields of the farm located next to the forest. The male deer grow antlers as they mature. How does this feature help them survive in their environment?
- A It helps them hear better.
 - B It helps them find food.
 - C It helps them defend themselves.
 - D It helps them run faster from predators.



13. Nina's 2-year-old brother picked up this leaf while walking with Nina in the forest. What physical characteristic might help Nina identify this leaf?
- A the color of the leaf
 - B the height of the tree
 - C the shape of the leaf
 - D the length of the tree's branches

14. Trees and food crops produce seeds. Other plants, like dandelions, have seeds that are adapted to be spread by the wind. Which of the seeds below is **MOST LIKELY** adapted to be spread by the wind?

A



B



C



D



ANSWER THE FOLLOWING CONSTRUCTED-RESPONSE ITEM IN YOUR ANSWER BOOKLET

NOTHING WRITTEN IN THE SPACE BELOW WILL BE SCORED.

(3 points)

- 15.** Nina often sees different organisms when she walks on the edge of the farm fields and the state forest. These organisms make up part of an ecosystem. Look at the following organisms.



Pine Tree



Fly



Worm



Owl



Grass



Snake

Refer to the text and picture above to answer question 15.

- Place each of the above six organisms in the following categories:
 - Producer
 - Consumer
 - Decomposer
- Explain the role of the decomposer in the ecosystem.

- 16.** Which of the following human activities has caused some plants and animals to become endangered?
- A** recycling
 - B** oil spills on lakes
 - C** wildlife photography
 - D** reforestation projects
- 17.** Which of the following provides organisms with all of their basic life requirements?
- A** soil
 - B** water
 - C** habitat
 - D** consumers

- 18.** Dinosaurs are extinct organisms that lived millions of years ago. How are scientists able to learn anything about them?
- A** by studying ores
 - B** by studying fossils
 - C** by studying erosion
 - D** by studying volcanoes



Praying Mantis

19. The praying mantis produces a hard egg case. Hundreds of baby praying mantises hatch from these cases each spring. They look just like the adults. Which of the following is an offspring of the praying mantis?



- 20.** Maria's family has two horses. One is a male and the other is a female. Both of the horses have long legs and are chestnut in color. If these two horses were to have a baby horse, what should Maria expect?
- A** a Shetland pony
 - B** a fast white stallion
 - C** a tall chestnut horse
 - D** a strong work horse
- 21.** Which of the following organisms begins its life as a seed?
- A** frog
 - B** eagle
 - C** apple tree
 - D** grasshopper

DIRECTIONS

PLEASE TAKE OUT YOUR *REDUCING FRICTION INVESTIGATION JOURNAL*.

USE IT TO HELP YOU ANSWER QUESTIONS 22 THROUGH 25.

*Note: This model test uses 4 science investigation items from the 2001 elementary school MEAP Science Test. The teacher manual and student journal for this investigation are on the Merit Award website: www.meritaward.state.mi.us. Though the constructed-response item for the investigation in the model test is worth 2 points, the constructed-response items for the new science test will be worth **4 points**.*

22. Which is the **BEST** explanation of the results of your investigation?
- A Rollers reduce friction between objects.
 - B Rollers increase friction between objects.
 - C The less force, the more friction there is between objects.
 - D The more friction, the less force is needed to move an object.
23. How would repeating the experiment several times affect your conclusion?
- A The evidence would be wrong.
 - B The experiment would take longer.
 - C The equipment would wear out.
 - D It would give additional evidence to support your conclusion.

24. Fewer weights were needed to move the book on the straws. Which of the following is the **BEST** way to explain this?
- A Fewer weights meant less force was needed.
 - B Fewer weights meant more force was needed.
 - C Fewer weights meant that the book weighed less.
 - D Fewer weights meant that the straws increased friction.

ANSWER THE FOLLOWING CONSTRUCTED-RESPONSE ITEM IN YOUR ANSWER BOOKLET

NOTHING WRITTEN IN THE SPACE BELOW WILL BE SCORED.

(2 points)*

25. The investigation showed how straws reduced the friction of moving the book.
- Identify at LEAST two other materials that could be used to reduce friction in a similar investigation?

*(*Note: In the new MEAP Test, all constructed-response items in an investigation cluster will be worth 4 points.)*

PART 2

DIRECTIONS

In this test you will demonstrate your understanding of science.

You will have at least 50 minutes to complete this part of the test.

This test includes both multiple-choice and written-response questions. For the multiple-choice questions, use only a **No. 2 pencil** to mark your answers. Make a dark mark that completely fills the corresponding oval **in your ANSWER BOOKLET**. If you are not sure of the answer to a multiple-choice question, mark your **BEST** choice and go on to the next question. If you change an answer, be sure to erase the first mark completely. Remember, mark only **one** answer for each question.

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Note: You may now begin Part 2 by reading an article and answering a series of questions about it.

Read the article below and answer questions 26 through 29.

Water on the Moon

Scientists may have found ice on the surface of the moon. If so, this water could be used in the future to produce oxygen for a moon colony or rocket fuel for space travel.

In 1994, a spacecraft named Clementine was launched. It orbited the moon for 4 months and mapped its surface using radar. Scientists believe they discovered ice in a huge, deep crater at the moon's south pole. Sunlight never reaches much of the south pole. Temperatures in the shadows there may be as low as minus 233 degrees Celsius (minus 387 degrees Fahrenheit). Scientists think the ice came from comets and became trapped in the cold, dark crater. On other parts of the moon, any water in direct sunlight evaporated into space long ago.

Although scientists think the material is probably ice, they can not be sure, especially since the ice is mixed with dirt and rock, and is not pure. Another spacecraft, the Lunar Prospector, will be sent to the moon next September. Maybe then we will learn more.

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26. On what area of the moon do scientists believe they have found ice?
- A east side
 - B west side
 - C north pole
 - D south pole
27. According to scientists, what **MOST LIKELY** happened to water on the moon when it was in direct sunlight?
- A It formed icebergs.
 - B It evaporated into space.
 - C It was absorbed by the moon's surface.
 - D It condensed to form vapor on the moon.

28. Comparing Earth and the moon in size, which of the following statements is correct?

- A The moon is larger than Earth.
- B The moon is smaller than Earth.
- C The moon is about twice as large as Earth.
- D The moon is exactly the same size as Earth.

ANSWER THE FOLLOWING CONSTRUCTED-RESPONSE ITEM IN YOUR ANSWER BOOKLET

NOTHING WRITTEN IN THE SPACE BELOW WILL BE SCORED.

(4 points)

29. Scientists have suggested that the ice may be used to produce oxygen for a moon colony or rocket fuel for space travel. In its current state, the ice cannot be used as a source of drinking water.

- Using the article, explain two reasons why the ice cannot be used, as is, for drinking water.
- What could be done to improve the quality of the water so that it might be used for drinking?

Garrett has several different plants. Each of his plants has different requirements. To make sure that Garrett keeps his plants healthy, he has recorded their requirements in the chart below.

Garrett's Plants

Plant Type	Water	Fertilizer	Sun
Ivy	Every 2-3 days	Once monthly	Partial sun
Vinca	Once weekly	Once monthly	Shade
Violet	Every 4-6 days	Every two weeks	Partial sun
Cactus	Every 2 weeks	Every 6-8 weeks	Full sun

Refer to the text and table above to answer questions 30 through 33.

30. Which of Garrett's plants is **BEST** suited to grow in hot, dry climates?

- A** Ivy
- B** Vinca
- C** Violet
- D** Cactus

31. Which of Garrett's plants is **BEST** suited for surviving in a wetland area?

- A** Ivy
- B** Vinca
- C** Violet
- D** Cactus

32. Garrett's family lives on a farm. In order to water their fields, Garrett's family must have a freshwater source. Which one of the following is **NOT** a source of fresh water?

- A** lakes
- B** wells
- C** rivers
- D** oceans

ANSWER THE FOLLOWING CONSTRUCTED-RESPONSE ITEM IN YOUR ANSWER BOOKLET

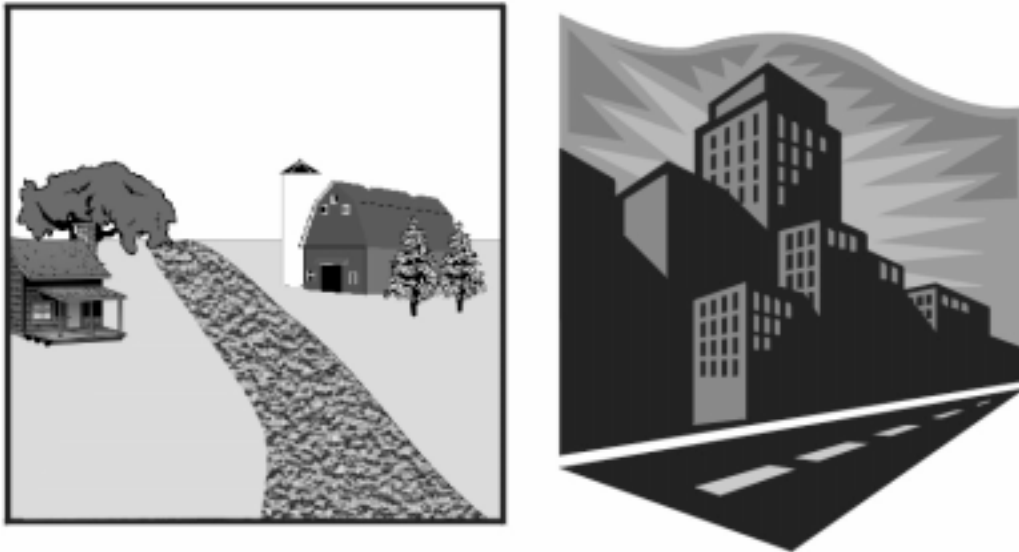
NOTHING WRITTEN IN THE SPACE BELOW WILL BE SCORED.

(3 points)

33. Some plants give us fruits while others do not.

- Describe the life cycle of a plant that grows fruit, beginning with the seed.

Sarah lives on a farm. During her summer vacation she goes to the city to visit her Aunt Martha. The city is very different from the countryside where she lives.



Refer to the text and picture above to answer questions 34 through 37.

- 34.** The road leading to Sarah's farm is a gravel road. The road to her Aunt Martha's home in the city is paved. How is the texture of the gravel road different from that of the paved road?
- A** The gravel road is stiff and heavy.
 - B** The gravel road is smooth and wet.
 - C** The gravel road is cold and flexible.
 - D** The gravel road is rough and bumpy.

- 35.** Aunt Martha has a new stove in her home. When she cooks dinner, Sarah notices that the burner becomes very hot. The metal pan on the burner also gets hot. What causes the pan to become hot?
- A** The color of the stove conducts heat.
 - B** The air around the pan conducts heat.
 - C** The metal pan conducts heat from the burner.
 - D** The pan's plastic handle conducts heat from the burner.
- 36.** Martha has a microwave oven and a bread machine. What type of energy do these items use?
- A** light energy
 - B** sound energy
 - C** nuclear energy
 - D** electrical energy

ANSWER THE FOLLOWING CONSTRUCTED-RESPONSE ITEM IN YOUR ANSWER BOOKLET

NOTHING WRITTEN IN THE SPACE BELOW WILL BE SCORED.

(3 points)

37. Sarah bought a hot dog and a soda pop from a food stand in the park. There was a musician playing a violin nearby.

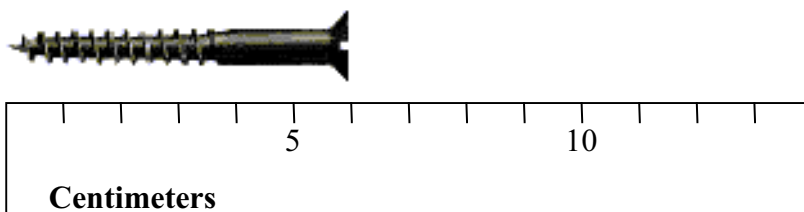
- What type of energy does the hot dog represent?
- What type of energy does the music represent?
- Provide at least one more example of each type of energy.

38. Ms. Carpenter likes to keep a record of the growth of her children, Jada and Troy. Every month she has them stand next to her tape measure so that she can record how tall they are. The following chart shows their growth over the past 4 years:

	1996	1997	1998	1999
Jada	127 cm	130 cm	135 cm	137 cm
Troy	112 cm	112 cm	114 cm	117 cm

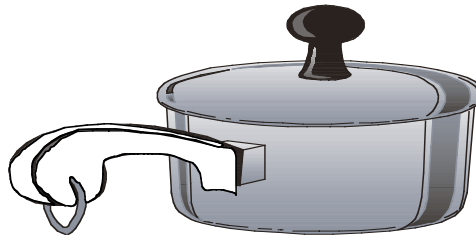
Based on the information in the chart, which of the following statements is correct?

- A Jada is shorter than Troy.
 - B Troy is shorter than Jada.
 - C Jada is heavier than Troy.
 - D Troy is heavier than Jada.
39. How long is the screw in the picture?



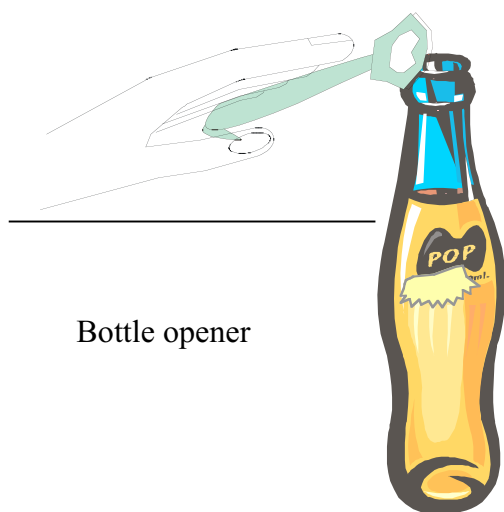
- A 4 centimeters
- B 5 centimeters
- C 6 centimeters
- D 7 centimeters

40. Tara's father was preparing soup for her lunch. When Tara removed the lid from the soup kettle, she burned her hand on the lid's hot metal handle. Next, she grabbed the pot by its white plastic handle to remove it from the stove. The handle was not hot and did not burn her hand. What can Tara conclude from her experience?



- A Black objects do not conduct heat.
- B Plastic conducts heat and metal doesn't.
- C Metal conducts heat and plastic doesn't.
- D Lid handles always burn your hands when cooking.

41. Sounds are produced when objects, or some part of them, begin to vibrate. The sound an object makes changes when the speed of vibration changes. If an object begins to vibrate very fast what will happen to the sound?
- A It will have no pitch.
 - B It will have a lower pitch.
 - C It will have a higher pitch.
 - D It will not change in pitch.
42. While playing basketball, Maria throws the ball high into the air. What force is **MOST LIKELY** to cause the basketball to return to the ground?
- A gravity
 - B friction
 - C magnetism
 - D wind



Bottle opener



Nutcracker

Nutcracker

43. Look at the tools above. Which type of simple machine do they represent?

- A lever
- B wedge
- C pulley
- D inclined plane

- 44.** Garth's father works in a metal shop. There are always metal shavings on the floor. If Garth wants to separate out all of the iron shavings, what tool could he use?
- A** filter
 - B** magnet
 - C** thermometer
 - D** hammer
- 45.** Jasmine's mother asks her to fill the ice cube trays and put them into the freezer. Which of the following shows the phase change that happens when the water freezes?
- A** liquid→gas
 - B** gas→solid
 - C** liquid→solid
 - D** solid→liquid

46. Peter's mother makes him empty his pockets each evening when he comes home. One night he removes the following items:

- a penny
- a marble
- a stick of gum
- a popsicle stick
- a marshmallow
- a piece of string

Which of the following is **NOT** a valid property for dividing the items into two different groups?

- A shape
- B length
- C magnetism
- D hardness

Scoring Key**Elementary School MEAP Model Science Test**

Item	Answer	MSCF* Code	Note
1	D	I.1.e.6	
2	B	V.4.e.2	
3	C	V.3.e.2	
4	C	V.3.e.1	
5	C	V.2.e.1	
6	D	V.1.e.6	
7	D	V.1.e.3	
8	C	V.1.e.6	
9	B	I.1.e.6	
10	C	I.1.e.6	
11	--	V.1.e.6	refer to the scoring rubric for this constructed-response item
12	C	III.4.3.2	
13	C	III.2.e.2	
14	B	III.2.e.5	
15	--	III.5.3.1	refer to the scoring rubric for this constructed-response item
16	B	III.5.e.4	
17	C	III.5.e.2	
18	B	III.4.e.1	
19	D	III.3.e.1	
20	C	III.3.e.1	
21	C	III.2.e.3	
22	A	I.1.e.2	
23	D	IV.1.e.1	
24	A	IV.3.e.2	
25	--	I.1.e.2	refer to the scoring rubric for this constructed-response item
26	D	I.1.e.5	
27	B	I.1.e.5	
28	B	V.4.e.1	
29	--	V.2.e.3	refer to the scoring rubric for this constructed-response item
30	D	I.1.e.6	
31	A	I.1.e.6	
32	D	V.2.e.3	
33	--	III.2.e.3	refer to the scoring rubric for this constructed-response item
34	D	IV.1.e.1	
35	C	IV.1.e.2	
36	D	IV.1.e.3	
37	--	IV.1.e.3	refer to the scoring rubric for this constructed-response item
38	B	I.1.e.6	
39	C	I.1.e.4	
40	C	I.1.e.2	
41	C	IV.4.e.1	
42	A	IV.3.e.2	
43	A	IV.3.e.4	
44	B	IV.2.e.2	
45	C	IV.2.3.1	
46	C	IV.1.e.1	

* Michigan Science Curriculum Framework, Summer 2000.

GRADE 5 MODEL TEST
SCORING RUBRIC FOR CONSTRUCTED RESPONSE ITEMS

Item 11

Scoring Points:

- 2 = 3 or more acceptable factors
- 1 = less than 3 acceptable factors
- 0 = inappropriate response

Item 15

Scoring Points:

- 3 = student correctly categorizes all 6 organisms and provides an explanation
- 2 = student correctly categorizes all 6 organisms but fails to explain decomposer

OR

- student correctly categorizes 4 or 5 organisms and provides an explanation
- 1 = student correctly categorizes 3 or 4 organisms only
- 0 = the response fails to meet the requirements for 1 point

Item 25 (Investigation item: 4 points in the **new** test)

Scoring Points:

- 2 = 2 or more acceptable responses
- 1 = 1 acceptable response
- 0 = incorrect response

Item 29 (Text Criticism item)

Scoring Points:

4 = student provides two pieces of evidence from the article and suggests a reasonable way to improve the quality of water

3 = student provides one piece of evidence from the article and suggests a reasonable way to improve the quality of water

2 = student provides two pieces of evidence from the article only

OR

student suggests a reasonable way to improve the quality of water only

1 = student provides one piece of evidence from the article only

0 = student fails to provide any correct information

Item 37

Scoring Points:

3 = student provides 2 correct types of energy and 2 examples

2 = student provides 2 correct types of energy and 1 example

1 = student provides 1 correct type of energy with or without an example

OR

student provides 2 correct types of energy without examples

0 = student provides 0 correct types of energy regardless of examples